



State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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August 3, 1999

TO: Pam Grubaugh-Littig, Permit Supervisor *pgl*
THRU: Joe Helfrich, Permit Supervisor *JH*
FROM: Robert Davidson, Soils Reclamation Specialist *RAD*
RE: Phase II Bond Release, Western States Minerals, J.B. King Mine, ACT/015/002-99B, File #2, Emery County, Utah

SUMMARY:

On June 11, 1999, the Division received a Phase II and Phase III bond release request from Western States Minerals. The Division's response on July 6, 1999, states the amendment will be processed for Phase II bond release only. This review covers soils related issues concerning soil stabilization and acid/toxic forming materials. This review concludes that the Phase II bond release submittal is incomplete.

TECHNICAL ANALYSIS:

RECLAMATION PLAN

TOPSOIL AND SUBSOIL

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-240.

Analysis:

State regulations R645-301-880.320 gives the requirements for Phase II bond release. Either of the following soils related requirements must be satisfied prior to Phase II bond release:

- **Evaluation of Erosional Soil Stabilization.** Show suspended solids or runoff outside the permit area is not in excess of the requirements set by UCA 40-10-17(j) and by R645-301-751.
- **Evaluation of Soil Productivity for Prime Farmlands.** Show soil productivity for Prime Farmlands has been returned to equivalent levels as farmed land in the surrounding

area according to the requirements set by UCA 40-10-11(4) and by R645-301-200.

Acid and Toxic Drainage - UCA 40-10-17(j)

Lands to be released shall not contribute suspended solids or runoff outside the permit area in excess of the requirements set by UCA 40-10-17(j).

For which the applicable parts state:

(j) Minimize the disturbances to the prevailing hydrologic balance at the minesite and associated offsite areas and to the quality and quantity of water in surface and groundwater systems both during and after surface coal mining operations by:

(i) Avoiding acid or toxic mine drainage by such measures as, but not limited to:

'p4(A) Preventing or removing water from contact with toxic-producing deposits;

During May 1994, a drilling and sampling program was conducted at the JB King mine for the following three reasons:

- Geotechnical testing to determine acceptable sideslope materials for the reclamation channels.
- Determine the toxic and/or acid forming characteristics of the channel material into which the proposed reconstructed channels could potentially erode.
- Determine the toxic and/or acid forming characteristics of the refuse material.

The resulting July 1995 permit amendment (incorporated Oct. 5, 1995) provides analyses results for both the channel and refuse materials at the site. The amendment states the site will not produce acid and toxic forming material after mixing with non-toxic fills through erosion processes. Adjacent offsite areas were also sampled and were shown to be generally similar to the onsite samples, except they were non-acid forming. Sampling and conclusions were based in part on the State of Utah guidelines for topsoil and overburden management for underground and surface coal mining.¹ The amendment showed the following:

- The channel and native soil materials containing toxic levels of boron and selenium.
- The refuse pile materials contained toxic levels of boron and selenium, and the refuse was shown to be acid forming.

¹Leatherwood, J., and Duce, D., 1988. Guidelines for Management of Topsoil and Overburden for Underground and Surface Coal Mining. State of Utah Department of Natural Resources, Division of Oil, Gas and Mining.

The 1995 amendment contained errors with respect to reporting selenium and boron analyses. Both boron and selenium were reported as soluble, but were in fact analyzed as total. Additional boron and selenium testing was done in October 1994 using sample splits from the May 1994 samples. The Hansen, Allen and Luce 1994 report to Western States Minerals is summarized as follows:

- Channel and native soil materials contained non-toxic levels of boron and selenium
- The refuse pile materials contained toxic levels of selenium.

Reclamation at the J. B. King Mine was conducted in 1985-86. The resulting convex surface results in a land form predisposed to erosion. Currently no refuse is exposed at the refuse pile. However, it is obvious that rills and gullies have formed at the reclaimed site, especially in the area located south of the refuse pile and north of the main drainage channels. In this east-central site area, off-site drainage flowing across the reclaimed surface has resulted in considerable rill and gully formation, often exposing buried coal refuse material (Figures 1 thru 3); this exposed coal refuse is not associated with the refuse pile. Refuse is also exposed at the lower end, north east eroding bank of the main, right fork drainage channel (Figure 4). This east-central site area is identified as AREA 3, Figure 2, JB King Mine site Layout Transect and Area of Influence Map, Soil Loss Evaluation of the Reclaimed JB King Mine, May 1999, WSMC Engineering, Reno, Nevada.

UCA 40-10-17(j), (i), p4(A) specifies that reclamation must prevent or remove water from contact with toxic-producing deposits. As evidenced by the exposed coal refuse materials in the rills, gullies, and channel, water has been in contact with possible toxic-producing deposits. According to the October 5, 1995 incorporated amendment, harmful effects of toxic and acid forming materials should be nullified through the erosion process by mixing with other non-toxic/non-acid forming materials. The sedimentation pond captures the sediment and runoff. Over the life of reclamation, neither the Division nor Western States Minerals has ever observed or recorded any discharge from the sedimentation pond. At a minimum, the pond sediments should be sampled for toxic and acid forming characteristics according to the Division's guidelines for topsoil and overburden. After storm events, the pond water should be sampled according to State criteria for water quality, including selenium and pH. If sampled sediment and water test results prove negative accordingly, then bond release should proceed. If the test results prove positive, additional measures must be considered and implemented prior to bond release.

Erosional Stability (Soil Stabilization) - R645-301-244

Erosion Monitoring Program

The Phase II bond release application does not provide summary information for the "Erosion Monitoring Program". As specified in the approved Mine Reclamation Plan, the "Erosion Monitoring Program" was set up for the reclaimed JB King Mine in 1995 to monitor erosion for Bond release purposes.

Soil Loss Evaluation - RUSLE

Western States Minerals presents a "Soil Loss Evaluation" report dated May 1999, which discusses erosive activity at the JB King Mine site as determined using the Revised Universal Soil Loss Equation (RUSLE). The "Soil Loss Evaluation" report includes (1) a prediction of the current rate of soil loss at the site, and (2) a comparison of the RUSLE prediction versus an estimate based on the sediment amounts collected in the sediment pond. As reported by Western States, the RUSLE prediction for soil loss at the reclaimed site is 1.27 tons/acre/year; average soil loss based on the sediment pond is 1.48 tons/acre/year.

RUSLE is an accepted model for determining the average annual soil erosion rates exclusive of rill, gully and channel erosion rates. However, Western States did not use actual soil data associated with each of the six transects within the mine site study area. Each region associated with a transect represents areas with different soils characteristics within the reclaimed site. Elements of the RUSLE equation (e.g., K factor) require specific soil physical parameters for determining the value that represents site specific soils. These soil parameters would include, but not be limited to, soil permeability, soil structure, % very fine sand, coarse fragment % by weight, % rock cover, and soil density. The "Soil Loss Evaluation" report uses old data from 1993 that doesn't represent each transect. The 1993 soil data does not report % very fine sand, soil permeability, soil density, % rock by weight, or % surface rock cover. Additional transect specific data should include % canopy cover and soil root mass. These parameters and others need to be sampled and collected specifically for each of the six transects. Using old, non-site specific data, or averaging across the site for other values, does not accurately represent each region and therefore does not validate the values used to determine the annual erosion rate.

Prime Farmlands Evaluation - UCA 40-10-11(4)

No prime farmlands exist on site; therefore, UCA 40-10-11(4) does not apply.

Findings:

Information provided in the application is not considered adequate to meet the requirements of this section of the regulations. The applicant must provide the following in accordance with:

UCA 40-10-17(j), (i) p4(A), R645-301-120, and R645-301-731.300, Sample and analyze the pond sediments for toxic and acid forming characteristics according to the Division's guidelines for topsoil and overburden. Provide analyses for sediment pond water, at seasonal high and low water levels, according to State criteria for water quality, including selenium and pH.

R645-300-140 thru -143, As specified in the approved Mine Reclamation Plan and prior

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to Phase II bond release, the "Erosion Monitoring Program" needs to be concluded and summarized to compare on-site erosion to off-site erosion.

R645-301-244, R645-301-120, and R645-301-731, The amendment must contain current and specific soil information when using the RUSLE equation in the "Soil Loss Evaluation of the Reclaimed JB King Mine" report.

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Figure 1. Area 3 gully erosion into coal refuse material.



Figure 2. Area 3 gully erosion into coal refuse material.



Figure 3. Area 3 gully erosion into coal refuse material.



Figure 4. Left fork channel bank has eroded exposing coal refuse.